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MEETING NOTES
GALAXY/SPECTRON SITE

13 February 2002

Attendees: Rob Sanchez, Rick Grills, Jim Gravette, Dave Pohl, and Tom Cornuet

Summary of Meeting Notes PREPARED BY TOM CORNUET, WESTON INC

(1) Risk Evaluation

As a follow-up to the meeting held on 22 January 2002 at EPA Region III offices, WESTON was tasked to review the Human Health Risk Assessment (HHRA) prepared by the PRP Group, evaluate the risks associated with site soils, and develop a preliminary clean-up goal for site-soils using the existing data presented in the HHRA. The following findings and estimated clean-up goals were discussed:

- WESTON reviewed the exposure pathways and assumptions in the HHRA and found the assumptions reasonable, and for the most part conservative. Both future industrial and residential scenarios were evaluated. The only pathway that was not considered was exposure of organic vapors in on-site buildings. This pathway should be included for the final HHRA.

- As presented in Section 5.1 of the HHRA, the predominant pathways that result in higher risk are ingestion of groundwater, inhalation of vapors from groundwater and dermal contact with groundwater. If these groundwater pathways are excluded, the overall site risk is within the allowable risk range of 10-4 to 10-6, except for the life-time residential scenarios. The risk associated with on-site soils for the industrial and commercial scenarios is within the allowable risk range. The risk associated with on-site soils for the adult and child residential scenarios is above the allowable risk range.

- The HHRA indicates that the greatest percent of the risk associated with groundwater is dermal (70%), followed by ingestion (20%). The risk associated with shallow-groundwater could be significantly reduced by installation of a physical barrier (cap system) and adoption of institutional controls to restrict use of shallow on-site groundwater. As discussed, the vapor pathway to buildings was not evaluated and needs to be included on the HHRA. This pathway would need to be address for any on-site buildings.

- Since only the residential scenario for soils exceeds the allowable risk range, WESTON presented the results of the development of preliminary soil clean-up criteria using the residential scenario and data presented in the HHRA. The preliminary integrated soil remedial goal (RG) for a 10-5 cancer risk were presented and the results indicated a RG of 1 ppm for 1,1,2,2 Tetrachloroethane, 5.25 ppm for tetrachloroethene, and 1.87 ppm for vinyl chloride. It was discussed that these RGs may be difficult to achieve using the horizontal sparge well technology. In addition, soils below the water table closer to the creek would be subject to re-contaminated by the upward gradient of the bedrock groundwater in this area. Contaminated bedrock groundwater flows upward to the overburden soil near the creek and would mixed with shallow-groundwater resulting in re-contamination of shallow-groundwater and saturated soils in this area. The RG would therefore be difficult to achieve in saturated soils near the creek until the contamination in the groundwater bedrock is significantly decreased.

- It was also pointed out that even if the VOCs could be reduce to below the RGs, the integrated RG includes risk associated with several PAHs and metals that would not be addressed by the SVE/Sparge technologies suggested to address site soil contamination.

(2) Unsaturated Soil Remediation ROD

It is difficult to address the unsaturated soil contamination with in situ remediation due to the following technical reasons:

- A horizontal biosparging well would need to be installed in or above the low-permeability layer which would be a difficult installation process,
- The treatment zone width would be very narrow due to the shallow depth,
- There would be no collection of stripped contaminants that did not completely biodegrade,
- Horizontal wells require a significant offset distance between the point of entry to the subsurface and the point where the target zone is reached potentially requiring that the horizontal well drilling rig be located offsite to be able to reach the intended target area onsite.

Soil Vapor Extraction would also be very difficult at this site due to the thin vadose zone. Additional dewatering to thicken the vadose zone would be very expensive. Therefore the unsaturated soils should be addressed with focused soil removal and an engineered permeable cap. The ROD should however include discussion regarding shallow overburden contamination and that it will be addressed as a result of the bedrock remediation that will be done in the future.

The engineered permeable cap would consist of a geotextile layer on top of the regarded and proof-rolled existing fill material, overlain by a 2-foot vegetated soil cover. Asphalt and concrete surface would be left in-place, but broken up to prevent perched water below the cover. Concrete would be restricted to maximum 2-foot diameter pieces that would be placed in depressions and worked into the surface. No protruding debris would be allowed at the surface. The entire area to be capped would be proof-rolled with a heavy roller to worked in any construction debris and provide a compacted stable subgrade for the cap system.

(3) Shallow (overburden) Groundwater Remediation

The advantage of conducting horizontal well biosparging in the shallow groundwater is that contaminants desorb into the gas phase faster than they do into the groundwater phase and the contaminant biodegradation rate will be significantly increased by the air injection. Therefore, the shallow groundwater mass removal rate would be increased by the horizontal well biosparging.

However, the shallow groundwater will virtually never be cleaned up by this effort due to the continual flux of contaminants from the bedrock into the shallow overburden. Also, it is difficult to address the shallow (overburden) groundwater contamination with in situ remediation (such as the horizontal well biosparging) due to the following reasons:

- Air injection will cause groundwater mounding, potentially diverting flow away from the drain system and inducing off-site flow (counterpoint – enhanced biodegradation will be occurring in situ).
- Aquifer clogging could occur due to increased iron precipitation and/or biomass accumulation caused by oxygen injection, potentially reducing airflow and inducing off-site migration.
- Potential off-site migration of air, or worse, methane or propane.
- Potential increased bio-clogging or metals precipitation in creek drain treatment system.
- Low permeability soils (such as the low permeability silt layer) can limit air migration and, therefore, also limit system effectiveness.
- No off-gas treatment (SVE system) of contaminants transferring from groundwater the phase to the vadose zone soil-gas phase would allow some portion of the contaminants to discharge to the air.
- Cometabolic biodegradation of PCE is not yet thoroughly demonstrated as an effective process. Don't AGREE RJS

(4) **Bedrock Groundwater Remediation**

- Significant dissolved phase groundwater contamination and some non-aqueous phase contamination exists in the bedrock at the site. DNAPL is currently being bailed out of AW-1 and this should continue as a source removal effort as long as it continues to be effective.
- The upward migration of contamination from the bedrock to the shallow overburden groundwater significantly impedes any efforts to

remediate the shallow overburden groundwater, therefore the most effective place to focus the contamination is in the bedrock.

- Horizontal well biosparging would be difficult in the bedrock for the reasons listed above plus the added difficulty and expense associated with drilling through the weathered and fractured undulating metamorphic bedrock at the site.

- Much progress has been made in the remediation of bedrock contamination in recent years. The current drain system working with the natural groundwater flow conditions which direct groundwater toward the drain system effectively contain the site groundwater plume and any groundwater that migrates under the site. Any bedrock contamination that is desorbed from soil or dissolved from DNAPL will migrate toward the drainage system and be contained and treated. Given these conditions there are several relatively new but proven remediation technologies that should be considered for this site. These include the following:

    1. In Situ Chemical Oxidation using peroxide, magnesium peroxide or some other effective oxidizer.

    2. In Situ Anaerobic Reductive Dechlorination Bioremediation using HRC, sodium lactate, or some other effective electron donor.

    3. Chemical Reduction using Bimetallic Nanoscale Particles (BNP).

    4. Steam or Surfactant injection.

(5) Future Offsite Pumping Issue

Possibly the greatest potential for human health risk resulting from this site could occur if significant groundwater supply pumping occurred in the future in the areas immediately surrounding the site. Significant groundwater withdrawal around the site could change the current flow toward the creek drain system and cause contaminated groundwater to migrate offsite and toward water supply wells. In order to prevent this from happening in the future institutional controls will need to be set up that will monitor future conditions to be sure that this does not happen. This monitoring effort should include a combination of water level data, groundwater sampling data, and groundwater modeling efforts.

(6) Monitoring of Existing Containment System

Additional monitoring of the existing containment system is needed to assure that the system is capturing the full flow during high precipitation events. The concern is that the current system operates at a certain head, and that under storm conditions may not capture the full flow into the system. The ROD for shallow groundwater shall contain requirements for additional monitoring of the water levels in the sumps and along the creek above and below the containment system.

(7) Suggested Components of the Onsite Soil and Shallow Groundwater ROD

- Engineered cap system composed of a geotextile and 2-ft vegetated cover. Prior to placement of the geotextile, the existing asphalt and concrete would be broken up to prevent perched water, and worked into the existing fill. The site would be regraded for positive drainage and the fill material compacted to provide a stable subgrade without protrusions of debris. The geotextile would provide a permeable physical barrier to the fill material. The vegetated cover would be restricted to grasses and small scrubs.

- Localized soil hot spots would be excavated and treated on-site or taken for off-site disposal. Clean-up criteria will need to be developed for these hot-spot locations. This is assumed to be a focused removal and not extensive soil excavation.

- Upgrading the monitoring system for the existing containment system to assure that the full flow under storm events is being captured by the system.

- Include language in the ROD that the bedrock groundwater is the major source of contamination and site risk, and needs to be addressed beyond the current containment system. It is recognized that the on-site soils and shallow groundwater are a smaller component of the overall contaminant mass, and therefore in order to reduce long-term site risk, the bedrock groundwater needs to be aggressively remediated to reduce this long-term potential exposure risk.

- A sentinel monitor well needs to be installed between the site and the shallow residential well. This well shall be screened in the shallow groundwater and monitored to confirm that the contaminated is not migrating pass this sentinel well.